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Performance of Groundnut (*Arachis Hypogaea L.*) Varieties for Yield and Yield Components in Guji Zone, Southern Ethiopia

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Abstract: Production and productivity of ground nut is limited due to lack of improved varieties as its high price as compared to other cereal and pulse crops. Thus, an experiment was conducted at Adola Red, Odo Shakiso and Goro Dola districts in 2019 and 2020 cropping seasons to evaluate adaptability of improved groundnut varieties. Treatments consisted of ten groundnut varieties (Roba, Baha-gudo, Werer-961, Babile-1, Babile-2, Bahe-gidu, Sedi, Tole-1, Fayo, Nc-4x), carried out in randomized complete block design (RCBD) with three replications. The analyzed result showed that yield and yield related parameters were significantly affected by varietal effect. Accordingly, Werer- 961 was early matured and produced the highest pods plant^{-1}, Sedi produces more number of seeds, Baha-gudo had y the highest seed weight (85.33g. However, Babile-1 produced the highest seed yield (2317 kg ha^{-1}) as compared to the other varieties. Babile-1 variety well performed and can be recommended for the growers in the study area to improve groundnut productivity.

Keywords: Ground Nut: Pea Nut: Performance: Oilseed: Yield Potential

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1.0 Background of the Study

Groundnut (Arachis hypogaea L.), also known as peanut is one of the world's most popular crops cultivated throughout the tropical, sub-tropical and warm temperate areas where annual precipitation is between 1000-1200 mm for optimum growth of the crop. The crop is native to South America, Mexico and Central America. Dissemination of groundnut to the old World most probably occurred in the 16th 17th centuries with the discovery voyages of Spanish, Portuguese, British and duchess (Hammons, 1994; Isleib et al., 1994). Groundnut has high economic and nutritional value and is an important cash crop for peasants in poor tropical countries.

Groundnut is ranked 5th among oilseed crops in the world after oil palm, soybean, rapeseed, and sunflower in terms of volume of production and is widely grown in more than 100 countries of tropical, subtropical, and warm temperate regions of the globe (FAOSTAT, 2019). It contains 48-50% oil and 26-28% protein, and a rich source of dietary fiber, minerals, and vitamins (Janila et al., 2013; Olufemi & Tenebe, 2021). In another study, FAOSTAT (2019) estimated that, annual unshelled groundnut production was around 60.5 million tons from about 31.2 million hectares of land and productivity of 1.9 tons per hectare in 2019 cropping season under rain fed conditions. Groundnut is an important crop from the perspective of food and nutrition security of poor smallholder farmers in developing countries, where it is grown widely. It is grown extensively in the developing countries of Asia, Africa and Latin America. About 62% of the production comes from South, East and Central Asia. Africa and Asia produced 91% of the world's total groundnut production (Nedumaran et al., 2015).

The lowland areas of Ethiopia have considerable potential for increased oil crop production including groundnut. The estimated annual groundnut production in Ethiopia was about 103, 062.38 tons from 64,649.34 hectares of production area. The average national yield was about 1.7 tons per hectare (CSA, 2019). It is mainly produced by smallholder farmers in the lowland area of Ethiopia. Currently, the production is concentrated in some areas of Oromia, Benishangul-Gumuz, Amhara, SNNP, Harari and Gambela regions. Eastern Hararghe zone of Oromia region hold primary position in producing and supplying groundnut both to domestic and export markets as compared to other parts of the country (Wijnands et al., 2009). Production and productivity of groundnut is increasing from year to year in Southern Oromia. However, the improved varieties are not yet exposed to farmers in moisture stress areas particularly in Guji Zone. Therefore, this activity was conducted with objective of evaluating adaptability of improved ground nut varieties and recommends the best adapted variety for the target areas.

2.0 Materials and Methods

The experiment was conducted at three districts characterized by different climatic condition using randomized complete block design with three replications at each location. Ten varieties were tested on plot size 4.8m^2 with row spacing of 60cm between rows and 10 cm between plants respectively. A distance of 1.0 m and 1.5 m were left between plots and blocks, respectively. Two seeds per hole were sown at a row spacing of 0.60 m and 0.20 m between plants.

Thinning was carried out after 15 days from sowing. Blended NPS fertilizer at 100 kg ha^{-1} was applied at planting time. Required Agronomic and Plant Protection practices were followed during crop growth period to raise a good crop. During harvest time, five representative plants were collected in net plot randomly from each plot.

Plot base data such as days to heading and thousand seed weight, stand count at harvest to adjust yield, and grain yield, dry weight of grain harvested from central row. The collected data was subjected to analysis by using SAS software version 9.1.

3.0 Results and Discussions

The analysis of variance revealed that there was significant between varieties for grain yield at three locations. So varieties performed differently across each location and they are genetically different. Similar result was reported by Tulole et al. (2008), Fikre Hagos et al. (2012) and Fantahun Woldesenbet (2014).

Table 1: Combined Analysis of Variance

Source of variation	d.f	Mean Squares							
		DF	DM	PH	NB	NMPO	NSPO	HSW(g)	KY
Replication	2	0.07	6.06	10.64	5.55	64.0	0.24	6.40	631277
Variety	9	156.76**	19.13**	3.29ns	91.29*	176.0ns	0.77**	1084.39**	2320765**
Residual	138	1.26	1.52	13.40	39.62	102.7	0.10	8.25	378003
Total	149								

3.1 Days to Maturity

Table 2 showed that there was statistically significant difference ($p < 0.05$) among groundnut varieties in days to maturity in both years. The highest days to maturity (166.7) was recorded in Baha-gidu which was statistically at par with Tole-1, Fayo and Nc-4x (Table 2). The lowest days to maturity (161) was obtained from Sedi and Werer- 961. They matured 4-6 days earlier than other varieties. Earliness or lateness in the days to maturity might have been due to their inherited characters, early acclimatization to the growing area to enhance their growth and developments. This agrees with the report of Alemayehu et al. (2014) which indicated that Lote-05 matured in 128 days while Sedi took 100 days to mature in eastern and southern Ethiopia.

3.2 Pods Number per Plant

Varietal difference causes significant difference in pod number per plant in both years. Werer-961 produced the highest (32.94) numerical data while the lowest (14.94) was gained from Tole-1 (Table 2). The highest pod number in Werer-961 variety was most likely due to the pod bearing capacity of the variety and more branch formation nature which leads to contain high number of pods per plant. Similarly, Sibhatu et al. (2017) reported that variety sedi produced significantly more pods per plant than other at Tanqua-Abergelle, Tigray. It was also in agreement with the findings of Caliskan et al. (2008)

3.3 Seed Number per Pod

According to Table 1, number of seeds per pod of groundnut was not significantly influenced due to varietal difference in both years. The pod of the varieties has the capacity of producing statistically similar number of seeds. Although, the result found a non significant relationship, the highest number of numerical pooled mean number of seeds per pod was reported in Sedi variety. In general, the seed number pod of groundnut ranged from two to three.

3.4 Hundred Seed Weight

Hundred seed weight significantly ($p < 0.05$) affected due to varieties in both years. Baha-gudo had numerically the highest seed weight (85.33g) though significantly at par with Tole-1. However, the lowest data (45.33) was shown in Nc-4x which however, did not significantly different from Fayo and Werer-961varieties. In addition, the highest seed weight in Baha-gudo could be most probably due to its efficient utilization of environmental growth resources so as to stimulate and enhance the photosynthetic and metabolic activities of the plant which resulted on the formation of healthy and well-structured seed. This result confirms the finding of Bale et al. (2011) who pointed out that weight of dry pods plant-1 was significantly affected by variety x sowing date interaction. Moreover, Caliskan et al. (2008) reported that both sowing date and cultivars significantly influenced 100-seed weight of groundnut

Table 2: Mean values of yield components of Ground nut varieties during 2020 cropping season

No	Variety	Parameters						
		DF (50%)	DM (90%)	PH (cm)	NB	NMPO	NSPP	HSW(g)
1	Roba	55.00a	165.0b	26.80	16.92a	21.25	2.08d	61.00c
2	Baha-gudo	46.67b	164.7b	24.92	12.14a-c	20.64	2.00d	85.33a
3	Werer-961	44.00d	161.7c	24.64	7.14bc	32.94	2.50bc	44.00d
4	Babile-1	45.67bc	164.3b	25.61	8.61a-c	31.00	2.08d	79.00b
5	Babile-2	55.00a	165.0b	25.53	16.16a	25.22	2.00d	78.33b
6	Baha-gidu	55.00a	166.7a	24.95	14.81a-c	25.44	2.00d	59.00c
7	Sedi	43.67d	161.0c	24.72	6.53c	22.39	3.08a	33.00e
8	Tole-1	55.00a	166.0ab	26.03	15.08ab	14.94	2.17cd	83.67a
9	Fayo	45.00cd	165.0b	26.30	8.47a-c	23.75	2.50bc	48.33d
10	Nc-4x	46.67b	165.3ab	24.92	12.86a-c	18.58	2.58b	45.33d
Mean	49.17	164.47	25.44	11.87	23.62	2.30	61.80	
LSD (0.05)		1.359	1.493	4.249	7.307	11.762	0.363	4.928
CV (%)		2.3	0.7	14.4	53.0	42.9	13.6	4.6

3.5 Shelled Seed Yield

The most promising variety is ultimately determined by the level of grain yield per unit area which is cumulative behavior of the yield components. Data presented in Table 2 revealed that varieties caused significant differences on seed yield in both years. The maximum yield (**2317** kg ha^{-1}) was obtained from Babile-1 variety. It was statistically similar with the other varieties like **Baha-gudo, Werer-961 and Baha-gidu**. The lower (1211 & 1248 kg ha^{-1}) numerical yield were obtained from Fayo and Nc-4x and statistically inferior to the other varieties respectively. The variation in marketable yield of these varieties could be due to their differences in genetic characteristics and agro ecological adaptability nature which is in line with the findings of Bale et al. (2011) who pointed out that grain yield

difference among varieties is attributed to more efficiency in the manufacture and partitioning of assimilates to the reproductive sink, which in turn led to more grain yield formation. In contrast to this result, Alemayehu *et al*. (2014) reported that Sedi variety gave a shelled seed yield of 20.42 to 29.44 qt ha^{-1} in eastern and southern Ethiopia which related to the current finding.

Table 3: Mean Kernel yield (kg ha^{-1}) of Groundnut varieties during 2019 and 2020

Variety	2019			2020		Overall Mean
	Odo Shakkiso		Goro Dola	Adola Rede		
	Diba Bate	Banti Korbo	Sirba	Dole	Kiltu Sorsa	
Roba	1580 $^{a-c}$	1449 $^{b-d}$	931	1174 ^{cd}	1625 ^{c}	1352 ^{cd}
Baha-gudo	2051 ^{a}	2104 ^{ab}	1826	1319 ^{c}	3000 ^{ab}	**2060** ^{ab}
Werer-96	1906 ^{ab}	2521 ^{a}	1340	2444 ^{b}	2139 ^{bc}	**2070** ^{ab}
Babile-1	2198 ^{a}	1806 $^{a-c}$	1764	2444 ^{b}	3375 ^{a}	**2317** ^{a}
Babile-2	2149 ^{a}	2097 ^{ab}	1531	1035 ^{cd}	2007 ^{c}	1764 ^{bc}
Baha-gidu	1851 ^{ab}	2292 ^{ab}	1427	1417 ^{c}	2146 ^{bc}	1826 $^{a-c}$
Sedi	927 ^{cd}	1917 ^{ab}	913	3090 ^{a}	1528 ^{c}	1675 $^{b-d}$
Tole-1	1118 $^{b-d}$	1410 $^{b-d}$	1288	757 ^{d}	1729 ^{c}	1260 ^{d}
Fayo	892 ^{cd}	615 ^{d}	1264	1500 ^{c}	1785 ^{c}	1211 ^{d}
Nc-4x	587 ^{d}	868 ^{cd}	1403	1208 ^{cd}	2174 ^{bc}	1248 ^{d}
Mean	1525.97	1707.78	1368.75	1638.89	2150.69	1678.417
P-value	0.007	0.012	0.303	<0.001	0.006	<.001
LSD(0.05)	900.15	984.42	784.18	552.19	892.72	491.99
CV(%)	34.40	33.60	33.40	19.6	24.2	40.6

4.0 Conclusions and Recommendations

This study found that productivity of groundnut can be enhanced by selecting genetically improved varieties. The results of this experiment showed that Babile-1 variety was early matured and produced the highest pods per plant, hundred seed weight and good performance in other parameters. Moreover, it gave the highest seed yield as compared to the other varieties. Therefore, it can be concluded that Babile-1 variety well performed and can be recommended for the growers in the study area to improve groundnut productivity. In view of this study results, the authors recommend that further investigation on different varieties along with different fertilizer levels, soil types and Integrated Pest Management (IPM) techniques can be a step forward to identify more realistic effect of different varieties on the growth and yield improvements of groundnut.

5.0 REFERENCES

Alemayehu, C., Berhanu, A., Mulugeta, T., Abdi, M., Tameru, A. & Helge, S. (2014). Opportunities and Constraints of Groundnut Production in Selected Dry Lands of Ethiopia. Dry Lands Coordination Group Report No. 74, Dry Lands Coordination Group C/O Miljøhuset, Norway. Http://Drylands-Group.Org/Publications/Groundnut-Production in Dry Lands of Ethiopia.

Bale, H. M. B., Ogunlela, V. N., Kuchinda, N. C. & Tanimuu, B. (2011). Response of Two Groundnut (*Arachis Hypogaea* L) Varieties To Sowing Date And NPK Fertilizer Rate In A Semi-Arid Environment: Yield And Yield Attributes. *Asian J. Of Crop Sci.,* 3(3):130-140

Berhane, S., Melesse, H. & Guesh, T. (2017). Groundnut (Arachis Hypogaea L.) Varieties Evaluation For Yield And Yield Components At Tanqua-Abergelle District, Northern Ethiopia. *Sky Journal Of Agricultural Research Vol. 6(3), Pp. 057 - 061*

Caliskan, S., Caliskan, M. E., Arslan, M. & Arioglu, H. (2008). Effects Of Sowing Date And Growth Duration On Growth And Yield Of Groundnut In A Mediterranean Type Environment In Turkey. Field Crops Res., 105:131-140.

FAOSTAT (2019). Food and Agriculture Organization of the United Nations. Available at: Http:// Faostat. Fao.Org/Site/339/Default.Aspx. (Accessed On November /24/2021).

Hammons, R. O. (1994). The Origin and History of the Groundnut, the Groundnut Crop, J. Smartt (Ed.) Chapman and Hall, London, UK., Pp. 24-42.

Isleib, T. G., Wynne, J. C. and Nigam, S. N. (1994). Groundnut Breeding, In: The Groundnut Crop. J. Smartt (Ed.) Chapman and Hall, London, U.K., Pp. 552-623.

Janila, P., Nigam, S. N., Pandey, M. K., Nagesh, P. and Varshney, R. K. (2013). Groundnut Improvement: Use of Genetic and Genomic Tools. Front. Plant Science, 4: 1-16.

Nedumaran, S., Abinaya, P., Jyosthnaa, P., Shraavya, B., Parthasarathy, R. and Cynthia, B. (2015). Grain Legumes Production, Consumption and Trade Trends in Developing Countries. Working Paper Series No 60. ICRISAT Research Program, Markets, Institutions and Policies. Patancheru 502 324, Telangana, India: International Crops Research Institute for the Semi-Arid Tropics. Pp. 64.

Oluwafemi, A. G. & Tenebe, I. T. (2021). Review of the Performance of Selected Natural Bio-Polymers for Fluid Loss Control in Water Based Drilling Fluid. American Journal of Multidisciplinary Research in Africa, 1(1): 1-11.

Wijnands, J. H. M., Biersteker, J. and Van Loo, E. N. (2009). Oilseed Business Opportunity in Ethiopia, Oil Seed Research Report, Addis Ababa, Ethiopia.